Calculus 1 Workbook

Solving limits

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SOLVING WITH SUBSTITUTION

■ 1. What is the value of the limit?

$$\lim_{x \to 3} -x^4 + x^3 + 2x^2$$

■ 2. What is the value of the limit?

$$\lim_{x \to 7} \frac{x^2 - 5}{x^2 + 5}$$

■ 3. What is the value of the limit.

$$\lim_{x \to -2} \frac{x^3 - 5x^2 + 4x - 6}{x^2 + 7x + 6}$$

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SOLVING WITH FACTORING

■ 1. What is the value of the limit?

$$\lim_{x\to -7} \frac{6x^3+42x^2}{2x^2+26x+84}$$

■ 2. What is the value of the limit?

$$\lim_{x\to 10} \frac{3x^2-39x+90}{x^2-3x-70}$$

■ 3. What is the value of the limit?

$$\lim_{x\to -8} \frac{2x^2+10x-48}{8x+64}$$

■ 4. What is the value of the limit?

$$\lim_{x\to 7} \frac{x^3-x^2-42x}{2x^2-20x+42}$$

■ 5. What is the value of the limit?

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$$\lim_{x \to 8} \frac{x^2 + 2x - 80}{2x^3 - 24x^2 + 64x}$$

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SOLVING WITH CONJUGATE METHOD

■ 1. What is the value of the limit?

$$\lim_{x\to 16} \frac{3(x-16)}{\sqrt{x}-4}$$

■ 2. What is the value of the limit?

$$\lim_{x\to 9} \frac{5\left(\sqrt{x}-3\right)}{x-9}$$

■ 3. What is the value of the limit?

$$\lim_{x\to 25} \frac{2(x-25)}{\sqrt{x}-5}$$

■ 4. What is the value of the limit?

$$\lim_{x\to 49} \frac{x-49}{3\left(\sqrt{x}-7\right)}$$

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5. What is the value of the limit?

$$\lim_{x \to 1} \frac{8(x-1)}{3\left(\sqrt{x}-1\right)}$$

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INFINITE LIMITS (VERTICAL ASYMPTOTES)

■ 1. What is the value of the limit?

$$\lim_{x\to 2} \frac{x^2 - x - 6}{-3x^2 - 3x + 18}$$

■ 2. What is the value of the limit?

$$\lim_{x\to -1} \frac{x^2 + x - 6}{4x^2 + 16x + 12}$$

■ 3. What is the value of the limit?

$$\lim_{x\to -4} \frac{x + 5}{-4x - 16}$$

■ 4. What is the value of the limit?

$$\lim_{x\to -1} \frac{x^2 - 9}{3x^2 - 6x - 9}$$

■ 5. What is the value of the limit?

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$$\lim_{x\to 3}\frac{x^2-4x}{x^2-2x-3}$$

6. What is the value of the limit?

$$\lim_{x\to -2}\frac{x^2-16}{-x^2+x+6}$$

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LIMITS AT INFINITY (HORIZONTAL ASYMPTOTES)

■ 1. What is the value of the limit?

$$\lim_{x\to\infty} \frac{3x^3 - 5x + 2}{9x^3 + 7x^2 - x}$$

■ 2. What is the value of the limit?

$$\lim_{x\to-\infty} \frac{4x^2 + 3x + 5}{-2x^2 + x - 9}$$

■ 3. What is the value of the limit?

$$\lim_{x\to\infty} \frac{x^3 + 6x^2 - 4x + 1}{x^3 + 9x + 8}$$

■ 4. What is the value of the limit?

$$\lim_{x\to\infty} \frac{3x^2 + 5x + 8}{x^3 - 5x - 9}$$

■ 5. What is the value of the limit?

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$$\lim_{x\to-\infty}\frac{19x+21}{x^3+15x+11}$$

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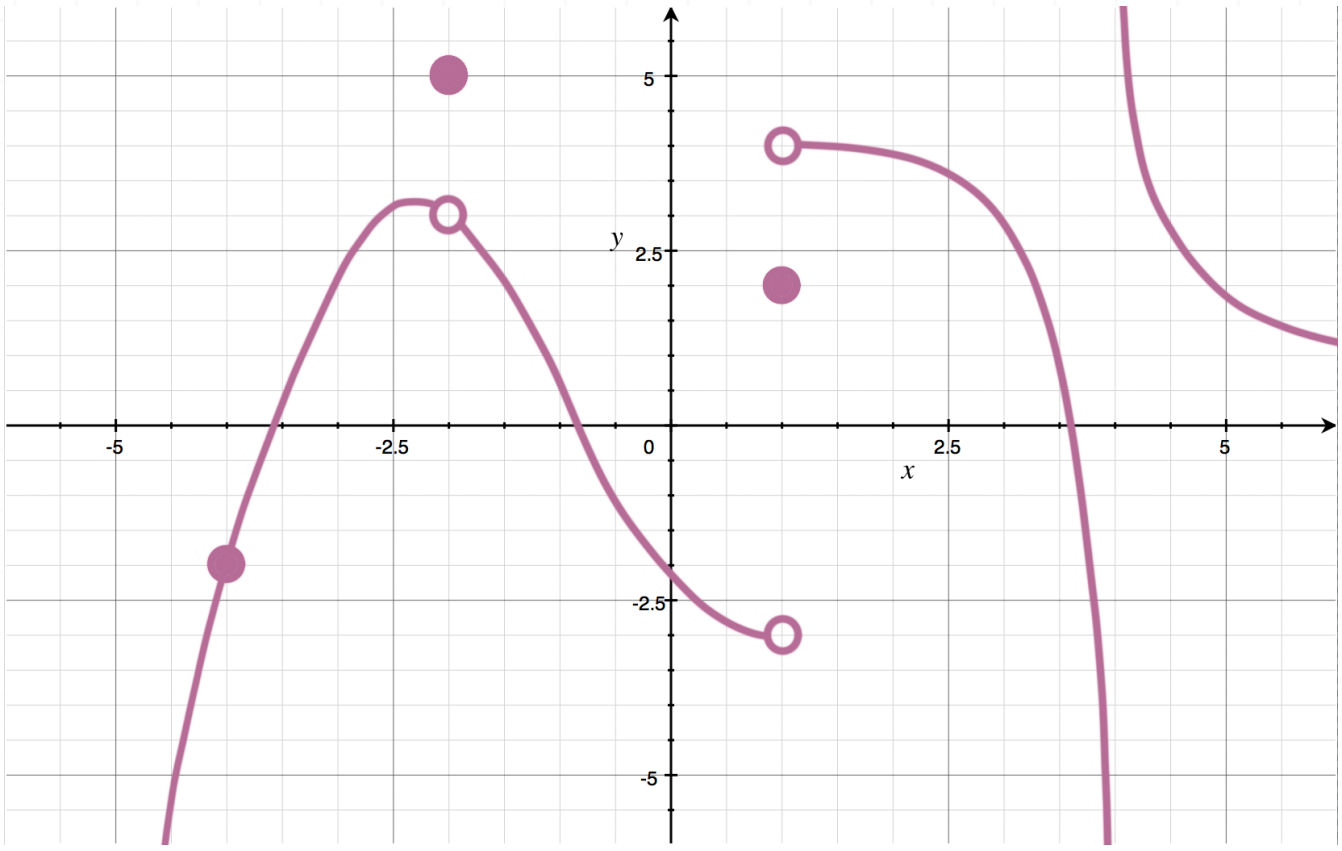
CRAZY GRAPHS

1. Use the graph to find the value of $\lim_{x \to 1} f(x)$.



2. Use the graph to find the value of $\lim_{x \to 5.5} g(x)$.

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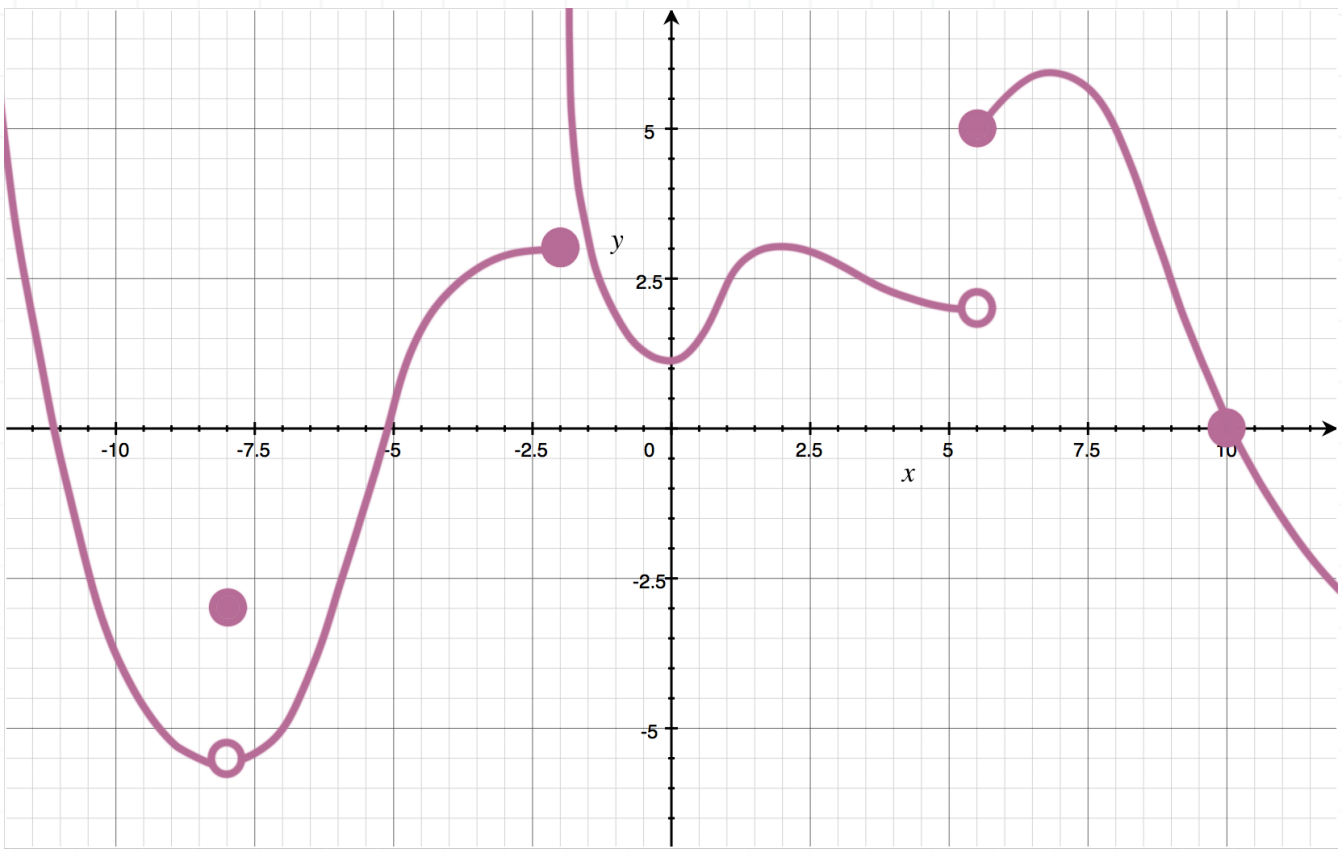
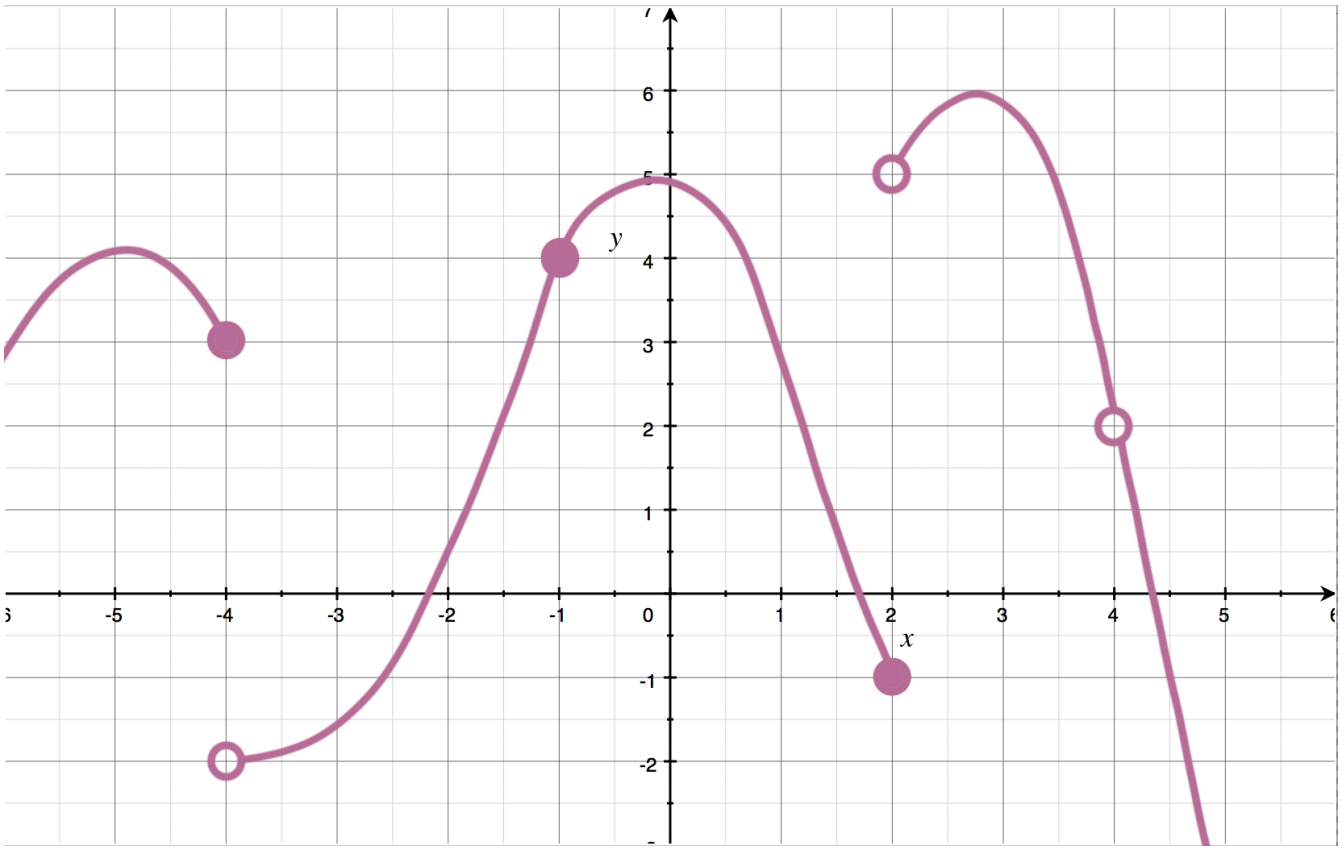


3. Use the graph to find the value of $\lim_{x \to 4} h(x)$.



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TRIGONOMETRIC LIMITS

1. Find $\lim_{x \to \pi} f(x)$ if $f(x) = 3\cos x - 2$.

2. Find $\lim_{x \to \frac{3\pi}{2}} g(x)$ if $g(x) = 4\sin x + 1$.

3. Find $\lim_{x \to -\frac{3\pi}{2}} h(x)$ if $h(x) = \tan\left(\frac{x}{6}\right)$.

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MAKING THE FUNCTION CONTINUOUS

■ 1. What value of c makes the function $h(x)$ continuous if c is a constant?

$$h(x) = \begin{cases} x^2 & \text{if } x \leq 4 \\ 3x + c & \text{if } x > 4 \end{cases}$$

■ 2. What value of c makes the function $f(x)$ continuous if c is a constant?

$$f(x) = \begin{cases} 5x - c & \text{if } x \leq 3 \\ 3x + 4 & \text{if } x > 3 \end{cases}$$

■ 3. What value of c makes the function $g(x)$ continuous if c is a constant?

$$g(x) = \begin{cases} x^2 - 4x + 8 & \text{if } x \leq 2 \\ cx - 2 & \text{if } x > 2 \end{cases}$$

■ 4. What value of c makes the function $f(x)$ continuous if c is a constant?

$$f(x) = \begin{cases} 2x^3 - 6x^2 + 8x + 3 & \text{if } x \leq 1 \\ cx + 9 & \text{if } x > 1 \end{cases}$$

■ 5. What value of c makes the function $g(x)$ continuous if c is a constant?

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$$g(x) = \begin{cases} \sqrt{x} + 18 & \text{if } x \leq 16 \\ x - 2c & \text{if } x > 16 \end{cases}$$

6. What value of c makes the function $h(x)$ continuous if c is a constant?

$$h(x) = \begin{cases} 11x - 9 & \text{if } x \leq 3 \\ x^2 + 3x + c & \text{if } x > 3 \end{cases}$$

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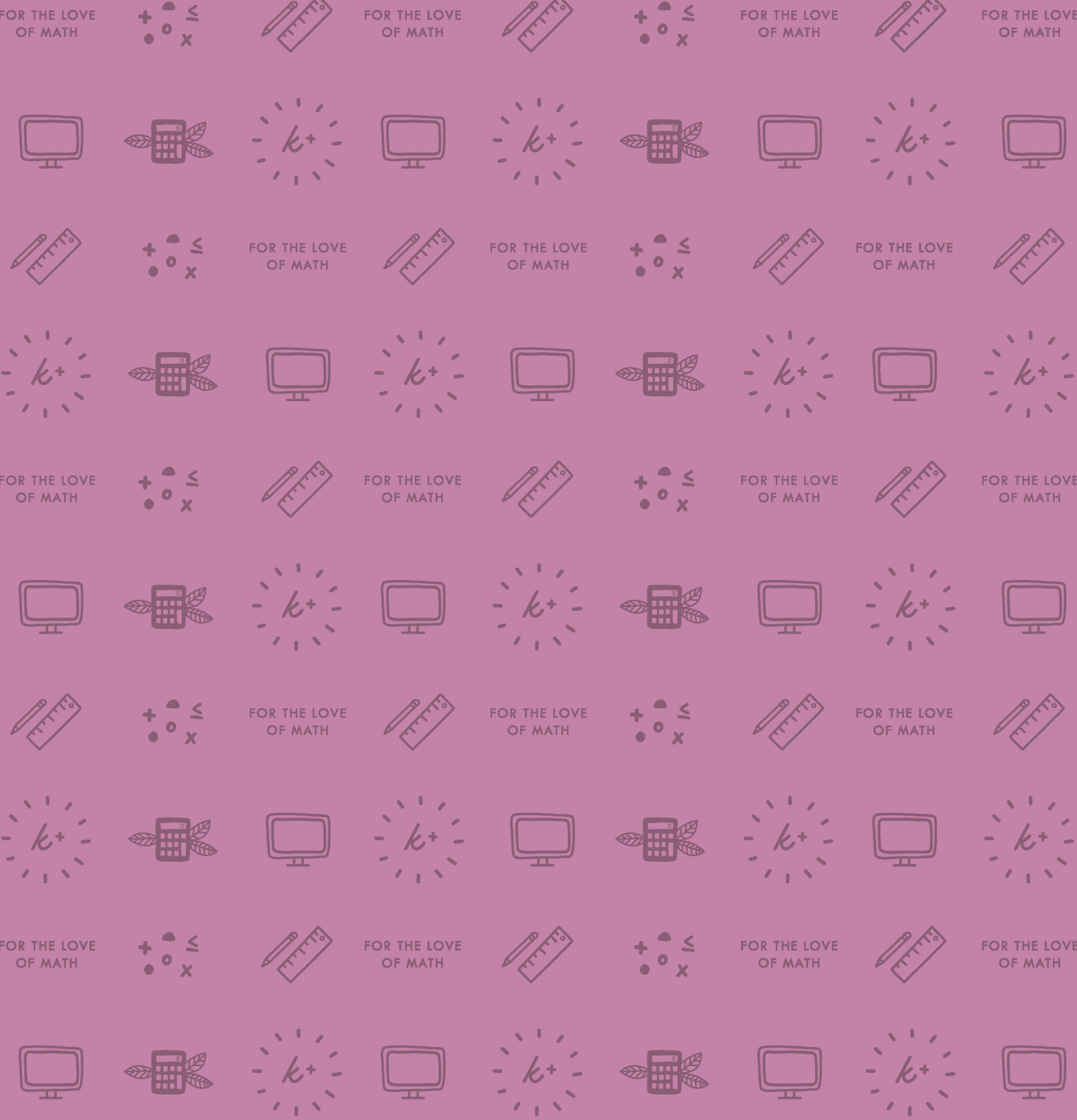

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